Notice of Allowability	Application No.	Applicant(s)	
	10/726,162	LEACH ET AL.	
	Examiner	Art Unit	
	Mark Ruthkosky	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *5/22/2007*.

2. ☒ The allowed claim(s) is/are *10,11 and 13-17*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 5/22/2007
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

MARK RUTHKOSKY
PRIMARY EXAMINER
6-10-07

DETAILED ACTION

Response to Amendment

This paper is in response to the amendment filed on 5/22/2007.

Claim Rejections - 35 USC § 102

The rejection of claims 1, 6, 12, and 13 under 35 U.S.C. 102(b) as being anticipated by Sherman et al (WO 01/09520) has been overcome by applicant's amendment to the claims.

Claim Rejections - 35 USC § 103

The rejection of claims 2, 7-8, 14 and 16-17 under 35 U.S.C. 103(a) as being unpatentable over Surampudi et al. (US 5,773,162), in view of Sherman et al (WO 01/09520) has been overcome by applicant's amendment to the claims.

Allowable Subject Matter

Claims 10, 11 and 13-17 are allowed.

The following is an examiner's statement of reasons for allowance:

The instant claims are to an electrostatically-actuated shutter and a fuel cell system including an electrostatically-actuated shutter, the shutter comprising:

(A) a first electrode held at a first voltage said first electrode having at least one opening therein;

(B) a second electrode held at a second voltage, that is different than said first voltage, and said second electrode having at least one opening therein;

(C) a diaphragm disposed between said first electrode and said second electrode, said diaphragm having openings therein that correspond with the openings in said second electrode, and which do not correspond with the openings in said first electrode;

(D) a driver coupled to said diaphragm that adjusts the voltage of said diaphragm such that when the driver sets a voltage for said diaphragm, the diaphragm is attracted to the fixed electrode having a different voltage, and when said diaphragm is drawn to said second electrode, its openings align with the openings of said second electrode to create apertures through which gases and vapors can flow;

(E) an additional diaphragm of a configuration such that it seals over the openings of the electrode to which it is drawn when said driver applies a predetermined voltage to close the shutter; and

(F) an exit port through which gases and vapors are delivered from said shutter, wherein said diaphragm and additional diaphragm that are each coupled to separate drivers that each apply a voltage to establish a predetermined voltage differential to draw its respective diaphragm to the desired electrode in order to open and close the shutter.

The prior art does not teach a shutter, as claimed, including a diaphragm of a configuration such that it seals over the openings of the electrode to which it is drawn when said driver applies a predetermined voltage to close the shutter; and an exit port through which gases and vapors are delivered from said shutter, wherein said diaphragm and additional diaphragm that are each coupled to separate drivers that each apply a voltage to establish a predetermined

voltage differential to draw its respective diaphragm to the desired electrode in order to open and close the shutter.

The most pertinent prior art is taught in Sherman et al (WO 01/09520), which teaches an electrostatically-actuated shutter use in a metal-air or fuel cell system (see pages 5-6, page 8, under Detailed Description and page 15, first paragraph.) The shutter comprises a first electrode having at least one opening therein held at a first voltage and a second electrode having at least one opening therein held at a second voltage that is different than said first voltage (see page 12, first paragraph and figures 8-11.) A diaphragm is disposed between said first electrode and said second electrode. The diaphragm includes openings therein that correspond with the openings in said second electrode. The openings of the diaphragm do not correspond with the openings in said first electrode as the openings are found across the full passageway and include both the openings of the first electrode and the non-open areas of the first electrode. A driver is coupled to said diaphragm that adjusts the voltage of said diaphragm such that when the driver sets a voltage for said diaphragm, the diaphragm is attracted to the fixed electrode having a different voltage, and when said diaphragm is drawn to said second electrode, its openings align with the openings of said second electrode to create apertures through which gases and vapors can flow. An exit port is noted in figure 11, through which gases and vapors are delivered from said shutter. As the shutter valve is "electrostatically driven" and includes a driving mechanism created from a fixed charge due to an electrostatic potential between two surfaces, it is considered to include predetermined voltages and moves according to the voltages applied to open or close the valve (page 8.) The diaphragm is a sacrificial oxide (dielectric) layer that is held close to the electrode at both ends, as it is bonded to the surfaces of the electrodes.

Sherman does not teach a second diaphragm, while the first diaphragm does not have the structure to seal the openings of the electrodes. Further, neither diaphragm is coupled to separate drivers that each apply a voltage to establish a predetermined voltage differential to draw its respective diaphragm to the desired electrode in order to open and close the shutter. The diaphragms are not directly coupled to drivers. The prior art also does not teach an electrostatically-actuated shutter wherein the first fixed electrode is generally flat, and the second electrode is of a dome shape, and the diaphragm is held to the closed position without an applied voltage such that the shutter is normally closed. With regard to claim 15, the prior art does not teach an electrostatically-actuated shutter wherein the diaphragm is substantially comprised of a dielectric material and further comprises a conductive layer embedded within said dielectric material which is connected to an electrical driver circuit. The most pertinent prior art, Sherman, does not teach that the diaphragm is substantially comprised of a dielectric material and a conductive layer embedded within said dielectric material. Further, the prior art does not teach the diaphragm is connected to an electrical driver circuit. As the prior art does not teach or render obvious the limitations of the claimed invention, the claims are allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745

6.10.2007